Hybrid Metal Nanocomposites As A Dual Modal Magnetic Resonance/Computed Tomography Imaging: *In Vitro* And *In Vivo*

P. Prabu[1], **A. Mukherjee**[1], **N. Chandrasekaran**[1*]

[1]*Centre for Nanobiotechnology (CNBT), Vellore Institute of Technology (VIT) University, Vellore City 632014, Tamil Nadu, India.*
E-mail: prabubiochemi87@gmail.com

Metal Nanomaterials are playing a progressively more significant role in multifunctional molecular imaging in diagnosis. Developing novel contrast agents for efficient magnetic resonance and X-ray computed tomography imaging (MRI/CT) sensitivity is very essential for early diagnosis of various diseases. In the present work, we have prepared novel, eco-friendly, non-toxic nanohybrid particle as efficient MRI/CT contrast agents. Superparamagnetic iron oxide nanoparticles (SPION) were prepared by co-precipitation method and functionalized with dimercaptosuccinic acid (DMSA). The nanohybrid particles (SPION@AU) were developed by integrating SPION and gold nanoclusters into bovine serum albumin matrix as a stabilizer. Then, physiochemical characterization and contrast enhancement of prepared nanomaterials were evaluated. *In vitro* (fibroblast cells) and *in vivo* (Wistar rats) studies proved the favorable biocompatibility of the prepared nanohybrid particles with their distribution across the cytoplasm and nucleus in cells and organs. It is also capable of enhancing the contrast in MR and X-ray CT imaging and drug delivery. Surface functionalization with a biocompatible DMSA/BSA matrix allowed us to obtain a novel targetable diagnostic and therapeutic tool. With this background, we can functionalize with drugs and targeted molecules and they will serve as a novel platform for multiple biomedical application.

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